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Fresh Fruit and Vegetable Waste in Self-Service Stores

By Donald R. Stokes

Losses from waste and spoilage are among the main cost items in the retailing of fresh fruits and vegetables. If these losses were avoided, in the long run the benefits would pass to consumers and producers. Although it is generally agreed that the country as a whole would benefit from a reduction of such losses, opinions as to their extent differ considerably.

In search of information on the extent of the losses, the Bureau of Agricultural Economics in cooperation with the American Stores Company of Philadelphia has conducted a series of weekly spot checks of waste and spoilage in four bulk stores in northern New Jersey. The fruit and vegetable departments of these stores had no refrigeration equipment. The spot checks were made during the year ended November 1946. In April and June 1946 and January and February 1947, weekly records were taken of two Philadelphia stores which were equipped with mechanical refrigerator display cases.

Weekly store records were obtained in this way: Inventories were taken at the beginning and the end of each week. Daily receipts of produce were determined by weighing or counting the quantity received. By subtracting the retail value of the week-end inventory from the beginning inventory and adding the week's receipts, the investigators determined the potential retail sales value of each commodity.

Three Kinds of Loss

Three kinds of waste and spoilage were recorded. "Concealed loss" was the loss in the shipping containers in which produce was sent to the store. For example, if 15 pounds in a box of tangerines arriving at the store were spoiled, this was recorded as concealed loss. "Markdown loss" was the difference between the prevailing retail value of the produce and the price at which it was sold. For example, if apples were billed to the store for sale at 15 cents a pound, but because of slight decay and handling damage were sold at 10 cents a pound, a markdown loss of 5 cents a pound was recorded. Over-ordering is a frequent cause of markdown losses. "Garbage loss" was the value of the produce that spoiled in the store, and was completely discarded. The three kinds of losses make up the total losses in handling each commodity. (Carrot and beet tops discarded at the customer's request were not considered as economic losses to the retailer.)

The average rate of loss in retailing fresh fruits and vegetables, as measured in this survey, amounted to 6.9 percent of the retail value of the produce handled. The average loss on fruits was 6.6 percent, on perishable vegetables 8.5 percent, and on "hardware" vegetables 2.9 per-

cent. Most of this .6.9 percent loss was garbage loss, which amounted to 4.3 percent. Markdown loss amounted to 1.5 percent and the concealed waste loss to 1.1 percent.

The method of measuring losses may not accurately reflect actual economic losses. If the losses had not occurred, a larger supply would have been available and retail market prices might have been lower. The value of losses would have been lower, too, if they had been valued at cost rather than at the selling price. But this method does indicate the relative economic losses among commodities under various conditions.

EXTENT OF WASTE AND SPOILAGE LOSSES IN MERCHANTISING FRESH FRUITS AND VEGETABLES IN BULK, NONREFRIGERATED, SELF-SERVICE FOOD STORES

Annual Losses

Annual rates of loss for 54 of the 65 commodities handled exceeded 5 percent. Items with the highest rates of loss were: Persimmons, 45.7 percent; blackberries, 34.3 percent; strawberries, 28.0 percent; brussels sprouts, 26.3 percent; lima beans, 24.6 percent; "face" pumpkins, 23.9 percent; apricots, 21.4 percent; kale, 21.3 percent; escarole, 21.2 percent; and kohlrabi, 20.0 percent.

The average rate of loss on each of the specified items was 20 percent or greater. But most of them are relatively less important than many other items on the total sales of fresh produce throughout the year.

Persimmons had a garbage loss of 37.1 percent. Blackberries, on the other hand, had a garbage loss of only 14.3 percent, but a markdown loss of 20.0 percent. This markdown loss was relatively high because the price frequently was reduced when deterioration first began to show, to avoid a total loss. The situation for fresh strawberries was similar. Garbage loss was only 9.3 percent, but price reductions accounted for 18.7 percent.

Brussels sprouts had a garbage loss of 17.4 percent, a concealed loss of 5.5 percent, and a markdown loss of 3.4 percent. The garbage loss could have been partially decreased by more price reductions. Although markdown losses might be larger, total losses would be smaller.

The garbage loss for lima beans was 16.4 percent, but the markdown loss was 7.7 percent and the concealed loss was 0.5 percent. Deterioration of lima beans in the store is usually the result of a relatively slow turnover--which means high garbage and markdown losses. Again, in some stores this high garbage loss could have been reduced by prompt price reductions.

The annual average dollar loss by commodities is perhaps more significant to the retailer in his consideration of possible methods of reducing waste and spoilage costs than are his percentage losses. Bananas ranked first in value of average weekly losses--a value of \$7.00--although they ranked fortieth in percentagewise losses. The bulk of the waste was garbage loss. However, the loss may not be typical for this

commodity, since many of the bananas imported into this country during the last few years have been of low grade.

Oranges ranked second in value of loss, with a weekly average of \$5.17, but ranked sixtieth in percentage loss. The highest percentage loss was 19.2 percent for Florida Temple oranges. (But sales of this variety are relatively unimportant compared with the total quantity of oranges handled.) The average percentage loss was 5 percent on California oranges. The loss on Florida bulk oranges was 3.8 percent. Florida oranges accounted for approximately 70 percent of the total value of oranges handled in the stores that were surveyed. The percentage loss on bagged Florida oranges amounted to only 2.4 percent, compared with the 3.8 percent for bulk oranges. The percentage loss on California bagged oranges was only 0.5 percent but amounted to 5.0 percent for California bulk oranges. California bagged oranges were not bagged in California, but were shipped in the conventional way and bagged at the grocery warehouse. Concealed waste at the warehouse is not included.

Lettuce was the third in value of loss, with a weekly average of \$4.84. It ranked thirty-sixth in percentage loss, with a rate of only 8.4 percent. Most of the loss in retailing lettuce came from price reductions. Garbage losses were relatively less important. The lettuce retailed in the surveyed stores was graded according to size and sold by the head. The loss from the original trim was not considered an economic loss to the retailer. The average weekly retail value of the lettuce handled was about \$58. Approximately 85 percent was western Iceberg lettuce, and a considerable quantity of Iceberg lettuce from near by was handled. Boston lettuce and Romaine lettuce were relatively unimportant.

Tomatoes ranked fourth in value of loss, with a weekly average of \$4.03, but ranked fifty-fourth in percentage loss--5.1 percent. As would be expected, most of the loss was garbage loss. Approximately 87 percent of the tomatoes handled in the surveyed stores were prepackaged. The average loss rate on repacked tomatoes was 4.8 percent, compared with 5.7 percent on the relatively small quantity of bulk tomatoes.

Melons were fifth in value of loss, with a weekly average of \$3.78. They also ranked relatively high in percentage losses, with a rate of 13.0. A large share of the loss in retailing melons was garbage loss. There was only a relatively small markdown loss, but concealed loss was 4.5 percent. The greater share of the value losses in retailing melons was on cantaloupes, but the casaba melons showed a loss rate of 28.0 percent.

Peppers were the sixth in value of loss and with a rate of 15.4 percent ranked fairly high in percentage loss. Deterioration in the store accounted for the greater share of the losses and frequently caused complete garbage loss. Markdown and concealed losses were relatively small.

Apples were seventh in value of loss. They ranked fifty-fifth in percentage loss with only 4.7 percent. Concealed loss and markdown loss accounted for about one-third of this and garbage loss the remainder.

Cauliflower was the eighth commodity in value of loss. It ranked twenty-sixth in percentage loss with a rate of 11.8 percent. Markdown loss amounted to 6.4 percent, a little larger than the garbage loss of 5.0 percent.

Escarole was ninth in both value of loss and in percentage loss. Spinach ranked tenth in weekly value of loss, but thirty-eighth in percentage loss with a loss rate of 8.1 percent. Approximately 60 percent of the spinach handled in the surveyed stores was bulk and the remainder was packaged in plastic-film bags. The loss rate on bulk spinach was 9.0 percent, and on bag-wrapped spinach 6.6 percent. Some of the bag-wrapped spinach was disposed of by reducing the price, but most of the loss in the bulk spinach was garbage loss.

Seasonal Losses

The seasonal variation in total average weekly loss rates of these retail food stores does not seem as great as might be expected. The average weekly loss rate was definitely greater during the second quarter than the other three quarters. The average rate for the first quarter was relatively low, probably because cool weather helped to minimize waste and spoilage. On the other hand, the relatively higher losses during the second quarter apparently can be attributed to the fact that fruits in the retail stores seem to break down more rapidly during these months, probably because many of them have been in storage for some time. Also, sizable quantities of highly perishable items like blackberries and strawberries appear on the market during this quarter. The volume of produce handled during the April-June quarter was somewhat less than during other quarters because the market supply of some important commodities, like stored fruits, were limited and the "summer vegetables" were not yet on the market in volume.

Concealed losses, on the whole, averaged around 1 percent of the total value of the produce handled, although they were lower during October, November, and December--probably because stored produce was absent from the market.

Garbage losses were low during the first quarter, as would be expected, chiefly because of favorable weather. They were relatively high during the second quarter and varied little during the third and fourth quarters.

Markdown losses on the whole did not vary much from quarter to quarter although they were somewhat smaller during spring and summer. This might be expected because faster deterioration during the warmer months would normally shorten the time when produce could be moved at reduced prices, before it became unsalable.

The average weekly loss rate on vegetables amounted to 8.5 percent, compared with a 6.6 percent rate on fruits. The seasonal loss rate on fruits showed some variation. The rate was only 5.4 percent during the first quarter in contrast to the fairly high rate of 9.0 percent during the second quarter. The loss rates on fruit for the third and fourth

quarters amounted to approximately 6.5 percent. The garbage loss on fruit was exceptionally low during the first quarter.

The average loss rate on perishable vegetables was relatively high throughout the year but was somewhat lower during the winter quarter.

The average loss rate on so-called hardware vegetable items such as potatoes was fairly uniform throughout the year, although the third-quarter rate was somewhat below average.

The fruit and perishable vegetable groups each accounted for approximately 43 percent of the total produce handled, and the hardware vegetable items accounted for most of the remaining 14 percent. During the fourth quarter, however, nearly half of the produce handled was fruits. Both perishable and hardware vegetables accounted for the rest. The difference in distribution rates in this quarter apparently was the result of the ending of production of summer vegetables and the influx of sizable quantities of fall fruits.

WASTE AND SPOILAGE LOSSES OF FRESH FRUITS AND VEGETABLES IN SELF-SERVICE FOOD STORES EQUIPPED WITH REFRIGERATED DISPLAY CASES

Growers, shippers, transportation agencies, and wholesalers are familiar with the necessity for refrigerating fresh fruits and vegetables to maintain freshness and quality. Precooling before shipment and refrigeration in transit and cold-storage warehouses are extensively used in the distribution of fresh produce. Until recent years, however, little refrigeration was used in retail stores. Some retailers have cold-storage boxes in their stores, and probably many more have the "produce barrel." But the majority have avoided the additional costs of refrigeration, hoping that a rapid turnover would minimize waste and spoilage losses. Many retailers who lack special refrigeration facilities use their meat refrigerators for overnight and week-end storage of some perishable vegetables.

A recent development in refrigeration for retail stores is the use of open-faced mechanical refrigerator cases. These cases are manufactured in 11-foot sections. The number required per store depends on the sales volume of fresh fruit and vegetables. Each unit has a well-lighted canopy running its entire length, with a mirror backdrop to increase the illumination and the attractiveness of produce display. A temperature of about 40° F. is usually suitable for commodities whose sales turnover is relatively rapid. Additional display space is provided for items that require no refrigeration.

Although these cases are usually used to display bulk produce, they are frequently used in merchandising prepackaged fresh fruits and vegetables. The extent of the refrigeration provided by these cases for prepackaged fresh fruits and vegetables sold at retail was determined in a survey made by the Bureau of Plant Industry, Soils, and Agricultural Engineering (USDA) and reported in the December 1946 issue of Refrigeration Engineering. This study showed how hard it is to get desirable refrigeration at various points in the cases--mainly because prepackaged produce interferes with air circulation.

Observations were made in the Bureau of Agricultural Economics survey to learn the extent of waste and spoilage losses of bulk produce in two stores where these cases were used. The observations were made in one store for one week each in April and June 1946, and in the other store for two consecutive weeks late in January and early in February of 1947. Although this was a small sample, it offers some basis for believing that refrigerated cases help in reducing waste and spoilage losses.

Waste Losses Significantly Lower

Waste losses were significantly lower in refrigerated stores. The average waste and spoilage loss in the stores equipped with refrigerated cases amounted to 2.7 percent. This figure includes concealed loss, .4 percent; markdown loss, .8 percent; and garbage loss, 1.5 percent. Data on which these figures are based were collected in the relatively cool months of January and February 1947, and in May and June 1946. For comparable months, the average waste and spoilage loss rate in the bulk stores without refrigeration was 6.5 percent.

Other factors that could not be controlled under normal conditions also affected waste and spoilage. Among these are the employees and the type of customers who patronize the store. Another variable that could not be controlled entirely was the general average quality of the merchandise handled. It appeared that quality of produce delivered to the two refrigerated stores was in some instances higher than the average quality of merchandise delivered to the conventional type of nonrefrigerated stores. This is indicated by the fact that the concealed loss rate was only .4 percent in the refrigerated stores, compared with about 1 percent in the bulk stores. Owing to these uncontrolled variables, it is not possible to make the claim that the difference in waste and spoilage in these two types of stores was entirely the result of refrigeration. However, this difference is a rough indication of the value of refrigeration, and there was evidence that the use of refrigerated cases reduced the spoilage loss on many individual commodities.

The value of refrigeration is indicated also by comparing the weekly average loss rates in refrigerated stores with those in nonrefrigerated stores. The weekly average loss rates in the 2 stores equipped with refrigerated cases was 2.2, 5.6, 2.0, and 2.1 percent for the weeks ending April 13 and June 15, 1946, and February 1 and February 8, 1947. Weekly loss rates observed in nonrefrigerated stores were 6.3 and 7.1 percent in two conventional-type nonrefrigerated stores for the week ending January 19; 3.3 and 5.2 for the week ending February 16; 7.9 and 8.1 for the week ending May 18; and 7.7 and 9.6 for the weeks ending June 22 and June 29, 1946.

Spoilage losses exceeding 5 percent were found for lima beans, eggplant, pineapples, parsnips, kale, sweet corn, asparagus, peaches, avacados, tangerines, rutabagas, beets, radishes, peppers, pears, and spinach. Some of these commodities were displayed in refrigerated cases and others, such as rutabagas, in a nonrefrigerated section of the produce stand. Generally, the more perishable vegetables were displayed in

the refrigerated cases. Fruits and hardware vegetables ordinarily were not refrigerated. So a better indication of the value of refrigeration can be obtained by comparing the average spoilage losses only on perishable vegetables in refrigerated stores with losses on similar vegetables in nonrefrigerated stores. This was done for the first two quarters.

The average loss rate on perishable vegetables in the refrigerated stores during this period was 3.5 percent--less than half the average 7.6 percent for nonrefrigerated perishable vegetables. The concealed loss was .5 percent in the refrigerated stores, 1.3 percent in the nonrefrigerated. This indicates that the quality of perishable vegetables received in the refrigerated stores averaged higher than in the nonrefrigerated stores. The markdown loss rate was 1.8 percent in both groups of stores. The difference in garbage loss was greatest. For refrigerated stores it was 1.2, compared with 4.5 percent for nonrefrigerated stores.

No great difference was found in the relative importance of the perishable vegetable groups handled in the two types of stores. This group accounted for 40.2 percent of the total retail value of produce handled in the refrigerated stores, and 43.4 percent in the nonrefrigerated stores.

Among the most important perishable vegetables, the loss rate in the refrigerated items in nearly every instance was significantly lower than in the nonrefrigerated items. The average loss rate on lima beans was considerably less in the refrigerated items, although it was still rather high in relation to other items. The average spoilage rate on eggplant, kale, sweet corn, beets, radishes, peppers, celery, rhubarb, summer squash, green beans, lettuce, cauliflower, prepared vegetables, cucumbers, tomatoes, cabbage, and green peas was definitely lower in stores equipped with refrigerated cases. Savings in waste due largely to refrigeration were most apparent in the large-volume items such as tomatoes, lettuce, green beans, and celery. In a few cases, particularly asparagus and spinach, the spoilage rate averaged greater in the refrigerated stores than in the nonrefrigerated stores. The reason for these exceptions is not known. It may be a difference in the quality of the merchandise or other factors on which further research would be helpful. But on the whole, it is obvious that spoilage losses for the highly perishable commodities in the refrigerated stores are markedly lower.

From the retailer's standpoint, it is more important for him to reduce his waste and spoilage cost by a small percentage in the high-volume items than to get a relatively greater percentage reduction in the less important items.

The savings to be gained from refrigeration are difficult to show except in a rather rough way. It may be possible for a produce department with a relatively small volume of sales to use one refrigerated case economically. Stores with larger volumes may be able to use two, three, or even more refrigerated cases economically.

Each of the refrigerated stores in which this survey was made used

two cases. The initial cost of a case was about \$1,000. The cost of amortization is usually written off during the first 5 years. Assuming that the weekly volume of business in perishable vegetables is about \$500, the cost of depreciation of the two refrigerated cases would approximate 1.5 percent of the retail value of the vegetables refrigerated. Estimates on the cost of maintenance of the cases run as low as .25 percent of the retail value of produce retailed from the cases. This indicates that the initial cost of the equipment and the cost of operation would be 1.5 to 2.0 percent.

It would appear, then, that savings in waste and spoilage on produce retailed from these cases should exceed 1.5 to 2.0 percent if refrigeration is to be justified. Savings above 2.0 percent should permit a lower cost of distribution. Data obtained in this survey indicate that the savings in waste and spoilage losses through use of mechanical refrigerator cases reached about 3 percent.

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NEW INDUSTRIAL USES SEEN FOR ALFALFA

A new method of processing fresh-cut green alfalfa promises to open industrial outlets for such alfalfa products as proteins and the pigments of coloring materials. Developed at USDA's Western Regional Research Laboratory, the process seems to assure savings in freight to distant markets for the processed alfalfa concentrates that are of high value as feeds, particularly for poultry.

The process concentrates and dehydrates the most valuable parts of the alfalfa, leaving the less valuable parts for use locally as feed.

Extraction of pigments and protein while the plant tissues are fresh and moist results in easier separation and no damage from heat or drying.

The machinery required is not complicated. Fresh-cut alfalfa is run through a disintegrator which separates it into two parts--one high in fiber and the other rich in proteins and pigments. The protein-and-pigment fraction is put through a hydraulic press, the juice from this pressing including a large proportion of the most valuable proteins and pigments of the plant.

This juice can be spray-dried to form a powdered concentrate of valuable proteins, vitamins, and pigments. The concentrate weighs only a small fraction of the weight of the equivalent meal.

Instead of being dried, the juice may be warmed mildly so as to coagulate the protein and then be pressed again. The coagulated protein cake then has a protein value of about 80 percent. The juice pressed from the coagulated protein includes a high concentration of coloring matter and vitamin values that would be useful to industrial and chemical concerns, or in feeds.

Saving Grain on the Farm

Farmers can make a great contribution to the food conservation program now being carried on in this country. They can make this contribution through the more efficient feeding of grain--the food most urgently needed for the relief of hunger abroad.

Approximately 71 percent of the total output of grain in the United States during the prewar years 1937-41 was fed to livestock. About 68 percent of our total grain supply in 1946-47 was fed, including 187 million bushels of wheat and 5 million bushels of rye. What the percentage will be in 1947-48 will depend upon the individual feeding practices followed by millions of farmers throughout the Nation.

The more efficient feeding of grain will make an increased volume of vitally needed food available for export, of course. That is the prime objective of the conservation program. But farmers have additional reasons--economic reasons--for using their grain supplies wisely. The efficient use of high-priced feed will mean lower costs and important savings.

Feed supplies are short this year--not seriously short, but shorter than in some other recent years. Though slightly larger than the 1937-41 average, the total supply of concentrates for 1947-48 is smaller than for any of the years since 1941. In terms of supply per animal unit, there are 1.03 tons for 1947-48, which equals the 1937-41 average but is smaller than in any recent year with the exception of 1943. Two facts--one, the fact that supplies per animal unit are equal to the prewar average, and the other, the improved roughage situation--provide farmers with a favorable basis for saving grain.

Here is the situation. Regardless of the conservation program, farmers generally will not be able to feed grain and other concentrates to their livestock at as high a rate as in 1946-47. Farmers in feed-deficit areas may have to cut the feeding rate sharply.

The bright spot in the feed picture this year is the large hay supply. Hay supplies for 1947-48 are estimated at 118,000,000 tons, as compared with 121,000,000 tons in 1946-47, and the 1937-41 average of 103,000,000 tons. Taking into consideration the prospective reduction in hay-consuming livestock, the supply per hay-consuming animal is expected to be the largest of record.

Here are some ways farmers can save grain:

Hogs

Feed hogs out to lighter weights. For every reduction of 1 pound in the average weight of all hogs marketed, 7 million bushels of high-priced grain would be saved. If the average weight of all hogs marketed during the year ahead could be held to 248 pounds--or 10 pounds below the near-record average of 1946-47--the saving in grain would be 70 mil-

lion bushels. If marketing weights could be held to an average of 237 pounds, the average for 1937-41, the saving in grain would be about 140 million bushels.

Feed a balanced ration. Hogs need from 10 to 18 percent protein in their ration. Growing pigs need a larger percentage; heavier hogs need a smaller percentage. This protein may be supplied by such feeds as tankage, oilseed meals, and to some extent by legume hay and alfalfa meal. Minerals should not be neglected, either.

Keep hogs on pasture as long as possible this fall. Plant rye this fall for temporary pasture next spring and plan now to seed rape next spring. Reserve a good legume or bluegrass pasture for hogs next summer.

Avoid death losses. Protect hogs against parasites and disease.

Beef Cattle

Feed fewer beef cattle to a slaughter grade that will average above the Good grade. A Choice yearling feeder steer usually requires between 40 and 45 bushels of corn to produce a Choice grade carcass with a weight gain of 250 to 300 pounds. It is estimated, on the basis of studies made by the Bureau of Agricultural Economics in 1945, that 60,000,000 bushels of corn or its equivalent in other grains, plus 85,000 tons of byproduct feeds, are used in the Corn Belt annually to fatten cattle beyond the average of the Good slaughter grade. During a season like the present one, when grass has been unusually plentiful, a larger than normal proportion of the cattle sold in the fall out of range areas can be marketed in good slaughter flesh with little or no grain feeding.

Feed more hay and other roughage. This can be substituted to some extent for concentrates in the feeding of cattle for market, particularly for larger animals. In this way, an increased number of cattle can be fattened and a larger quantity of beef for consumers obtained from a given quantity of concentrates.

Make maximum use of pastures. Keep cattle on grass pasture or stalk fields as long as possible this fall and put them on pasture as early as possible next spring. The feed that beef animals get from the pasture means just that much less grain to feed. But don't let cattle overgraze the pastures, particularly early in the spring. Let the grass get about 4 inches high before the cattle are turned out. After the grass is well grazed, move the cattle to another pasture.

Feed as little grain as possible for maintenance this winter. When cattle and calves are being carried through the winter to be placed on grass again in the spring, they require practically no grain for maintenance if plenty of good-quality hay, silage, or other roughage is fed, along with the necessary high-protein concentrates.

Carry some cattle on a maintenance of roughage for a few months before starting grain feeding. One of the reasons for feeding grain to cattle is to make a substantial number of cattle available for slaughter

in the spring and summer--a time when few cattle are being sold off pastures and ranges. If cattle are to be fed grain for a shorter period of time than usual, it is important for more cattle to be started on grain feed at a late date, say in early spring.

Dairy Cattle

Feed roughages to the limit. Good-quality hay and other roughages can be fed heavily without serious effects on total milk production. This is an economical and efficient practice, and it will result in some saving in grain. Go heavy on legume hays, such as alfalfa and clover.

Reduce the amount of grain fed to dry cows. Make maximum use of roughage in feeding dry cows. Reduce grain feeding sharply during the dry period if the cow is in good condition and the hay available is a legume of good quality.

Make maximum use of pastures. Keep cattle on grass pasture or stalk fields as long as possible this fall and put them on pasture as early as possible next spring.

Poultry

Reduce the size of laying flocks through culling. Although the poultry industry has reduced production substantially from the wartime peak, further readjustment can be made and yet provide an abundance of poultry and poultry products. USDA recently suggested that farmers cull their laying flocks this fall to such an extent that there will be 4 percent fewer layers on farms January 1, 1948, than there were a year earlier. Even with that reduction it will be possible to produce 375 eggs per capita in 1948.

Use more green feeds. This conserves grain. For example, place alfalfa hay in a rack in the poultry house and put the birds on range whenever possible. Good range will save a lot of grain next summer.

Keep flocks healthy. Only healthy chickens make good use of grain.

Reduce the mortality rate. This can be accomplished through buying quality chicks and poult. Poultry mortality has been averaging about 17 percent. Each bird lost represents less poultry meat and eggs for consumer use as well as some loss of feed. Reducing the mortality rate also requires the adoption of better sanitation practices, the exercise of greater care in raising chicks and poult, the use of vaccines for communicable diseases, and the purchase of disease-free chicks.

Feed economically. Don't overfill hoppers. More frequent filling will avoid waste and pay dividends.

Maintain quality of the product. When eggs deteriorate in quality because they are not collected frequently or are not properly stored, packed, or transported, fewer edible eggs will reach consumers. All the feed used in the production of the lost eggs is also lost.

Additional Projects Approved Under Research and Marketing Act

USDA has recently announced its approval, under the Research and Marketing Act, of a number of research projects that PMA will conduct or in which it will cooperate.

Sugar preferences and uses.--The greatly increased use in recent years of corn sugar and sirup (dextrose) as sweetening agents in place of cane and beet sugar (sucrose) and the effect of this change on the respective sugar industries will be the object of one of the research projects.

The use of corn sugar and sirup as sweeteners was greatly accelerated during the recent sugar shortage. The use of cane and beet sugar in liquid form, rather than dry, has been increasing for some time. Department sugar specialists point out, however, that specific information on the extent, nature, and effect of these increases and shifts, and considerations governing choices of types of sweetener, as well as other factors determining the markets and competitive relationships for corn, cane, and beet sugar, is not now available.

In carrying out the project, Government and trade sources will be used for statistics on production and use by types of industries for dry and liquid sucrose and corn sugar and sirup. These data will be supplemented, when necessary, by means of interviews and questionnaires. Chemical properties, sweetening and nutritive values, and other characteristics of dry and liquid sucrose and corn sugar and sirup that affect user preferences will also be studied.

Information gained as a result of the project is expected to help consumers and all segments of the cane, beet, and corn sugar industries in developing production and marketing programs.

PMA will direct the project. Assistance will be asked by the Bureau of Agricultural Economics, the Bureau of Human Nutrition and Home Economics, the Bureau of Agricultural and Industrial Chemistry, the U. S. Department of Commerce, and trade research organizations.

New packaging for dry beans, peas, and rice.--New and improved packaging to reduce losses and increase the efficiency of the marketing and distribution of rice and dry edible beans and peas will be sought in another project.

Considerable progress was made during the war in developing better packaging equipment and in using more attractive and more durable containers for dry beans, peas, and rice. But a great deal remains to be learned about improvements and refinements in existing packaging equipment and the manufacture of improved containers. The container industry also needs information on container sizes in order to supply the types

and styles of packaging required by the trade.

Through this project, it is hoped to provide the packaging industry with data necessary to determine trade container needs and to develop new and improved methods, machinery, and materials for packaging rice and dry beans and peas. An extensive study of trade experience with different sizes and types of containers by areas, and--in the case of beans, by varieties--will be made.

With the cooperation of representative packaging firms and retail chains, it is also proposed to carry out tests with various types and styles of containers to determine preferences and durability. These tests would be carried out after consideration of the size, geographic distribution, and the degree of consumption of the various commodities involved in different parts of the country.

Results expected from this project are economies in marketing and greater protection of the commodities from deterioration and loss of nutritive value. PMA will conduct the project, with the cooperation of the packaging industry and the retail trade.

Certified seed research.--Development will be sought of more efficient methods for marketing the seeds of improved varieties of legumes and grasses, to maintain their identity.

Department seed specialists point out that superior varieties of forage seeds have been developed through years of research by State and Federal agencies, but less than 2 percent of the total production of these seeds consists of improved varieties. The virtual impossibility of distinguishing improved seed varieties from common seed by appearance and the difficulty of handling them in regular market channels have curtailed the quantity of improved seed available to farmers. Therefore, a method of handling improved varieties of seeds in larger volume and in such a way as to assure maintenance of varietal purity from producer to consumer needs to be developed.

In carrying out the project, studies will be made to determine the effectiveness of records in maintaining seed identity in trade channels, and the extent of supervision needed to safeguard varietal identity. Ways and means of bulking small lots of seed will be sought, and studies will be made to determine what size or sizes of containers best meet consumers' needs.

Studies under the project will be made for the more important forage crops, including alfalfa, red clover, sweet clover, timothy, and bromegrass. The seed industry, the International Crop Improvement Association, and individual farmers will cooperate with PMA and the Bureau of Plant Industry, Soils, and Agricultural Engineering in carrying out the project. In making the study, data will be collected from all segments of the seed industry.

Improvements in market news services.--Another recently approved project calls for marketing research looking to improvement of market

news services.

Most major and some secondary markets are now provided with market information on one or more agricultural commodities through Federal and Federal-State market news services. The increasing reliance of producers and members of the trade on market information has created a growing demand for more effective, representative, and accurate market news. Accordingly, the research will be an attempt to evaluate the effectiveness and adequacy of existing market news services through a careful study of the various services as they now operate, their historical backgrounds, the reports issued, and the methods of collecting the information that goes into them.

The results of these and other studies will furnish background for an analytical approach to market news effectiveness. Later, plans are to provide direct assistance to market news divisions and reporters in effecting such adjustments in the content, presentation, distribution, and techniques as research indicates will improve the adequacy and effectiveness of market news.

The studies will be conducted by PMA in cooperation with the Bureau of Agricultural Economics.

Better methods for malting barleys.--USDA cereal scientists will seek improved methods for malting barley, and especially for satisfactory utilization of barleys not commonly used for malting purposes. Barleys of satisfactory malting quality adapted for growing in the North Central States have been severely damaged by diseases in recent years, and it has been necessary to use less satisfactory barleys from other areas.

The work will center on a research laboratory with pilot-plant facilities to be built on the University of Wisconsin campus at Madison. The laboratory will be equipped to serve all barley-producing areas and the malting industry for the entire country. Here scientists will investigate the inherent malting quality of various types of barley from many sources, including all new varieties released for production. They will also study the influence of environment on quality, and the relation of certain types of enzymes or ferments in barley to its malting quality.

The research will be conducted by the Bureau of Plant Industry, Soils, and Agricultural Engineering in cooperation with PMA, the State experiment stations in barley-growing areas, and trade groups.

Cotton marketing research.--Purpose of an approved cotton-marketing project is to bring the production of various types of cotton more into line with specific requirements of the textile industry.

Information will be obtained on the type and quality of cotton being used, as compared with the type and quality best suited for the various products made from cotton. Results are intended to reflect economic and technological factors in cotton marketing, and to indicate

the characteristics and adaptability of cotton produced in standardized-variety areas.

Department cotton specialists say the project should help strengthen the competitive position of cotton as a textile material by making supplies of the types best suited for various textile products more readily available. PMA will conduct the project.

Basic studies to find new uses for cotton.--The aim of new studies of the fundamental characteristics of cotton fiber with a view to finding entirely new uses for it will be to make more effective and complete the use of the many superior qualities inherent in cotton fiber. To do this six specific and new lines of work will be carried on:

1. Minute evaluation of the swelling of fibers when wet will be a basis for selecting cottons for new types of protective fabrics. The difference in moisture swelling capacity of cotton, flax, and rayon has long been known, but market differences in this respect have been noted recently in different varieties of cotton. An effort will be made to find out which types of cotton fiber show maximum change upon wetting and drying and to what structural features these processes can be attributed.

2. The changes that take place in the cellulose of cotton fiber upon oxidation will be studied in an attempt to reduce or eliminate the adverse effects of oxidation.

3. Investigations will be made to determine the possibilities of chemically bonding cotton fiber with resins in an effort to develop new products from cotton.

4. Improvement in elastic recovery of cotton fiber will be sought through various chemical treatments.

5. Intensive study will be made to develop practical energy measurements for evaluating the merits of cotton in mechanical end products such as tire cord and belting.

6. Work will be done on a special dyeing process as a means of estimating immaturity in cotton.

The research will be conducted by the Bureau of Agricultural and Industrial Chemistry at the Southern Regional Research Laboratory, New Orleans, in cooperation with PMA and the Bureau of Plant Industry, Soils, and Agricultural Engineering.

Gum naval stores.--Naval stores producers and processors are expected to benefit from a PMA-conducted project, aimed at determining the effects of operation of central stills on the income of gum producers, and measuring production and marketing gains resulting from central distillation. Until recent years, most large-scale producers have operated their own fire stills for distilling crude gum. Now some 30 central stills in Georgia, Florida, and Alabama have largely taken over this job.

One reason for USDA's interest in studying central still operations is their importance in naval stores loan programs. Loans are made on processed turpentine and rosin, and on the turpentine and rosin content of gum.

Four livestock research projects.--Projects aimed at increasing the efficiency of stockyards facilities and services, the improvement of livestock and meat grades and standards, and to provide for current and detailed information on slaughter and meat production have also been approved. They will be conducted under PMA supervision, with the cooperation of the livestock and meat industry.

The studies will be carried out as four projects: (1) To determine how to modernize and increase the efficiency of structures and facilities used in connection with receiving, delivering, yarding, weighing, and holding livestock consigned to public stockyards; (2) to bring about a more uniform application of live animal grades at wholesale levels in market reporting; (3) to improve market classes and grades of livestock; and (4) to provide USDA and the livestock and meat industry with weekly estimates of slaughter and meat production, and monthly estimates of slaughter by States.

Most of the principal terminal yards were built when producers shipped by rail, and although most livestock shipments are now made by truck, a majority of the yards have continued to utilize old facilities with minor modifications. Modernization is considered highly desirable by both the livestock industry and USDA livestock specialists. Under the project, Department experts will make studies to ascertain all existing inadequacies, and make corrective recommendations.

Improvement in the application of live animal grades in market reporting is considered desirable because of the increased selling of meat at wholesale on the basis of Federal grades. A more uniform application of grades between markets is needed by producers as an accurate basis for making intelligent decisions in the marketing of livestock. Under this project, grading experts will instruct market reporters as they observe live gradings to achieve more accuracy and uniformity in market reporting.

Federal standards for market classes and grades of livestock were first developed in 1916, and for meat 10 years later. Although amendments have been made since, livestock experts feel that further adjustments are necessary to reflect adequately the recent improvements in livestock production and processing, changes in animal types, shifts in marketing from large central markets to local markets, utilization of labor-saving devices, and changes in modes of living. Under this project, class and grade standards will be extended and improved through the use of photography, physical analysis, carcass measurements, organoleptic tests (such as tasting and smelling), and other devices and tests.

USDA and the livestock industry need current and more detailed information on slaughter and meat production in order to plan livestock marketing, meat buying, and production programs. Under the project,

weekly estimates, begun as an emergency war measure for use by the War Meat Board, will be continued. Before the war, only monthly estimates of slaughter and meat production under Federal inspection were published. Information on federally inspected slaughter by States also will be developed under the project and will be furnished to the Bureau of Agricultural Economics for combination with other data to determine total commercial slaughter by individual States.

Wool research.--Another project is aimed at improving the competitive position of domestic wool through the marketing of a skirted and sorted product. Most imported wools are skirted and sorted, and hence uniform in type and quality. Domestic wools are seldom subjected to these processes, with the result that imported wools command a premium known as the "conversion cost differential" (10 to 15 cents a pound, clean, or 8 to 12 percent of the sales price).

Under this project, studies will be made to determine the feasibility and cost of skirting and sorting domestic wool at ranches, concentration points, and warehouses. USDA will enter into agreements with State agencies, cooperative marketing associations, and wool pools for carrying out the project. The cooperating agencies will furnish labor facilities, graders and sorters, and will keep necessary cost records. The Department will provide the technical supervision and inspection. A pilot skirting and sorting project has been carried out during the past year in Texas with Commodity Credit Corporation-owned wool and funds.

Present plans call for projects at Casper, Wyo., Portland, Oreg., Roswell, N. Mex., Denver, Colo., and Minneapolis, Minn.

New U. S. Standards for processed fruits, vegetables.--Development of U. S. standards for grading processed fruits and vegetables for which no standards now exist, and the improvement of standards already established, will be sought in a research project approved and assigned to PMA.

Need for the development and improvement of standards for processed fruits and vegetables has long been recognized by the Department, processors, shippers, distributors, marketing experts, and consumer organizations, but lack of funds has limited research along this line.

The object of the project will be to provide official U. S. grade standards for processed fruits and vegetables and other processed foods for the purpose of (1) aiding processors in packing better and more uniform quality products; (2) aiding processors, distributors, and retailers in marketing these products in a more orderly manner; (3) aiding lending agencies to arrive at equitable loan values on processed foods; (4) providing a more equitable basis for adjusting damage claims; and (5) permitting inspection and certification as to quality, condition, and grades by Federal, Federal-State, and State inspection services.

In carrying out the project, standardization and inspection experts from USDA field laboratories will be assigned to conduct research in

major producing areas. Experiences and practices of growers, processors, and distributors will be studied, and samples will be analyzed. Data on factors which reflect quality such as color, absence of defects, and character of the product will be compiled. On the basis of these data, the Washington office will develop new standards or revise existing ones.

Federal and State agencies, and private organizations concerned with marketing processed fruits and vegetables, will be asked to cooperate.

Tobacco price and consumption study.--The relation of tobacco prices and price policies to production, supply, and consumption of the various kinds of tobacco will be conducted by the Bureau of Agricultural Economics in cooperation with PMA and other interested USDA agencies.

The study will be aimed at explaining price differences for types within the same class of tobacco--particularly flue-cured. Another aim will be to determine and measure factors that affect demand for tobacco products and to measure these results in terms of consumption and the general level of prices of the leaf the farmer has to sell.

Better marketing facilities.--Also recently approved is a project to find ways to reduce costs of foods by developing and promoting the construction of more efficient marketing facilities.

Department marketing specialists point out that physical handling accounts for the largest item of expense in the marketing of foods and farm commodities, and that such costs are unnecessarily high because of inadequate and antiquated marketing facilities and methods. In some cities, it costs as much to move perishable foods from the city limits to consumers as it does to grow, pack, and transport the foods to the city. In many producing areas, assembly markets where the products of various growers can be brought together, graded, packed, displayed, sold, and shipped to terminal markets are often unsatisfactory or nonexistent. The lack of labor-saving devices in many marketing establishments results in an excessive and costly use of manual labor. These conditions raise the cost of distribution, restrict the volume of movement, and result in quality deterioration and waste.

Under the project, studies will be made to determine what kinds of market facilities will make possible the most efficient handling of farm and food products at terminal markets, concentration points, and secondary markets. Time studies will be made in individual business houses to determine the time required to handle different commodities under various conditions with different types of equipment. The results of these studies will be made available as soon as possible, either in preliminary or final form, to interested individuals or organizations.

The project will be carried out by PMA. Trade and farm groups, State colleges, State departments of agriculture, municipalities, planning commissions, civic bodies, and transportation and warehousing agencies will cooperate.

MARKETING BRIEFS:

Cotton.--About 64 percent of this year's cotton acreage was planted by members of groups organized under the Smith-Doxey Act. This is the highest percentage to date. Both the membership and the reported acreage of these improvement groups showed substantial increases for this year over 1946. Membership rose from 343,704 to 350,105, and total acreage increased from 11 1/2 million to about 13 3/4 million.... Upland cotton ginned up to October 1 this year was much higher in grade than during the same period last year--100.4 to 98.4 according to the grade index (Middling White equals 100)--but the average staple length was one thirty-second of an inch shorter.

Dairy Products.--Between September 18 and October 22, PMA announced the following activities concerning milk marketing agreements and orders: Scheduled a public hearing for presentation of proposals to amend the Chicago order (41); and announced Department approval of amendments to federal orders regulating the handling of milk in the marketing areas of Louisville (order 46), Toledo (30), Wichita (68), greater Kansas City, Mo. (13), and suburban Chicago (69). USDA announced its recommendation, subject to industry approval, of the adoption of marketing agreement and order programs for the marketing areas of Paducah, Ky., Topeka, Kans., and Nashville, Tenn., and the merger into one Federal milk order of the orders regulating the handling of milk in La Porte (20) and St. Joseph (67) counties in Indiana.

Dried Fruit.--USDA announced on October 14 that the Commodity Credit Corporation had bought an additional 31,000 tons of Thompson seedless raisins, and that producers and others in physical possession of raisins at the time they submit their bids would be invited to offer immediately another 60,000 tons. The 31,000 tons were in addition to 30,000 tons previously bought through September 25.

Fats and Oils.--The price-support program for 1947-crop tung nuts has been amended to provide for the offering of contracts to tung nut producers on toll. Under these contracts, CCC would agree to purchase the tung oil produced from tung nuts grown by such producers so as to give them the same price support as is being received by processors. The price support is 25 cents a pound of tung oil, f. o. b. tank cars.... USDA in mid-October invited offers for the sale of crude soybean oil to the Commodity Credit Corporation. The offers must be submitted by telegram each Monday and Thursday, covering any quantity in multiples of not less than minimum tank carloads of approximately 60,000 pounds.

Flax Fiber.--Flax line fiber amounting to 400,395 pounds has been sold under USDA's offer announced last August 25.

Grain.--On October 9, USDA estimated that 1,335,000 long tons (50,-812,054 bushels) of United States grain and grain products were exported in September 1947. These exports included (in terms of whole grain equivalent, long tons) 829,000 tons of wheat, 360,000 tons of flour, and 146,000 tons of other grains and grain products.... Loans to producers

under the 1947 rough rice loan program will average \$1.69 per bushel, at farms or at approved country warehouses, USDA has announced. The \$1.69 per bushel average figure is 90 percent of the July 15 parity price of \$1.88 per bushel.

Insecticides.--USDA has issued regulations under the Federal Insecticide, Fungicide, and Rodenticide Act of 1947. Rodenticides and herbicides must be registered with the Department by December 25, 1947, and other economic poisons (including insecticides and fungicides) by June 25, 1948.

Livestock and Meats.--Allocation of 16,876,000 pounds of meat and meat products for commercial export during the October-December quarter this year was announced by USDA on September 17.... A national goal of 50,000,000 pigs for the spring of 1948 was suggested to farmers by USDA on October 22. The Department also reemphasized its request for feeding hogs to lighter weights. The goal compares with the 1947 pig crop of 53,000,000 pigs, and is a reduction of 3,000,000 or nearly 6 percent.

Peanuts.--A referendum on peanut marketing quotas for the 1948, 1949, and 1950 crops will be held on December 9.... USDA has announced State peanut acreage allotments which will apply to the 1948 crop if growers vote for marketing quotas in the referendum. The allotments total 2,359,372 acres. This is 35,213 acres more than the national allotment announced July 18, and represents an adjustment under provisions of the Agricultural Adjustment Act requiring that no State be given an allotment that is less than its allotment for 1941.

Seed.--Price supports for 1947-crop common alfalfa seed, amounting to 25 cents a pound for Northern alfalfa seed, 20 cents a pound for Central, and 17 cents for Southern have been announced by USDA. The supports will be operative through grower purchase agreements with CCC, in which CCC will agree to buy the seed in May 1948. The agreements will be available to producers from harvesttime through February 1948 upon payment of a nominal service fee. Last year, CCC offered only a loan program on alfalfa and other hay and pasture seeds. The 1946 loan rates for common alfalfa seed were 33 cents for Northern seed, 30 cents for Central, and 26 cents for Southern.

Sugar.--Sugar Control Export Order No. 1 has been amended so that it is no longer necessary for a shipper to secure an export authorization if the quantity of sugar to be exported is 100 short tons or less. This modification will permit minor needs in foreign countries to be filled without delay and will not endanger sugar supplies to American consumers.

Walnuts.--The salable percentage for merchantable walnuts under the Federal marketing agreement and order has been fixed at 80 percent for the 1947 crop year, and the surplus percentage at 20 percent. The salable percentage will be applicable to each handler's merchantable in-shell walnut pack and governs the quantity that can be sold to the distributive trade.

ABOUT MARKETING:

The following address and publications, issued recently, may be obtained upon request. To order, check on this page the publications desired, detach and mail to the Production and Marketing Administration, U. S. Department of Agriculture, Washington 25, D. C.

Address:

How Far Is It to Water? By Clinton P. Anderson, Secretary of Agriculture, at Phoenix, Ariz. October 30, 1947. 13 pp. (Mimeo graphed)

Publications:

School Lunch Recipes Using Dried Whole Eggs. (PMA and the Bureau of Human Nutrition and Home Economics) PA-19. October 1947. 9 pp. (Multilithed)

National School Lunch Program. (PMA) September 1947. 4 pp. (Printed)

Marketing Fruits and Vegetables, 1942-46: A List of References. (USDA Library) October 1947. 166 pp. (Mimeo graphed)

Shipments of Horses, Mules, and Cattle to Europe for Rehabilitation Purposes. (PMA) October 1947. 19 pp. (Mimeo graphed)

Fats and Oils in World War II--Production and Price Supporting Programs. (Bureau of Agricultural Economics) War Records Monograph 6. October 1947. 30 pp. (Multilithed)

Livestock Market News Statistics and Related Data, 1946. (PMA) CS-24. September 1947. 88 pp. (Multilithed)

The Balance Sheet of Agriculture, 1947. (Bureau of Agricultural Economics) August 1947. 67 pp. (Mimeo graphed)

Suggested Uses of Nonfat Dry Milk Solids. (PMA) October 1947. 7 pp. (Mimeo graphed)

Farm Grain Saving Fact Sheet. (Office of the Secretary) October 1947. 7 pp. (Mimeo graphed)

Programs To Effectuate a Long-Range Policy of Abundance. This is a series of six statements presented by the Secretary of Agriculture and associates before the House Committee on Agriculture and Subcommittee of the Senate Committee on Agriculture and Forestry on October 6, 7, and 8, 1947. The mimeographed parts are assembled separately and are titled as follows: I. Objectives and Potentials (19 pp.); II. Technological and Economic Research (13 pp.); III. Rural Facilities, Services, and Industries (19 pp.); IV. Conservation and Land Use Adjustments (12 pp.); V. Price Policy and Production Adjustment (29 pp.); and VI. Summary Remarks on Programs and Administration (10 pp.).

